Ground Water Compliance Action Plan for the Salt Lake City, Utah UMTRA Project Site

May 2000

Prepared by
U.S. Department of Energy
Grand Junction Office
Grand Junction, Colorado

Project Number UGW-511–0019–01–000
Document Number U0039502

Work Performed under DOE Contract No. DE–AC13–96GJ87335

Contents

Figures

Tables

Attachments will be provided upon request. Click Don Metzler or Audrey Berry to request.

A Position Paper on Applicability of Supplemental Standards (DOE 1996)
B Baseline Risk Assessment (DOE 1995)
C Hydrogeologic Characterization (DOE 1993)
D Report of Ground Water Monitoring (DOE 1995)
E Report of Ground Water Monitoring (DOE 1996)
F Ground Water Mound Resultant from Golf Course Irrigation (DOE 1993)
G Ground Water Quality Data by Parameter
H Results of 1999 Field Investigations
I Notice of Residual Radioactive Contamination

1.0 Introduction

This Ground Water Compliance Action Plan (GCAP) will serve as a stand-alone modification to the *Final Environmental Impact Statement -- Remedial Actions at the Former Vitro Chemical Company Site, South Salt Lake, Salt Lake County, Utah* (RAP) (DOE 1984) since no section in the RAP refers specifically to ground water restoration and the deferral of compliance with Subpart B of 40 CFR 192. The initial standards were released by the U.S. Environmental Protection Agency (EPA) in January 1983, just before the RAP was issued, and at that time the focus was primarily on compliance with Subpart A of 40 CFR 192 at the disposal site. The GCAP will be the U.S. Nuclear Regulatory Commission (NRC) concurrence document for compliance with Subpart B of 40 CFR 192 for the Salt Lake City processing site.

The proposed compliance strategy for the Salt Lake City site is based on the "compliance strategy selection framework" following the steps prescribed in Section 2.1 of the *Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action Ground Water Project* (PEIS) (DOE 1996c) (Figure 1). The proposed action is presented in Section 2.0 of this GCAP because a Site Observational Work Plan (SOWP) was not prepared for the site. Section 3.0 presents implementation plans for monitoring at the site. National Environmental Policy Act (NEPA) issues and environmental concerns are also addressed in Section 4.0 of the GCAP and this information has been made available to public officials and citizens in the area.

2.0 Ground Water Compliance

To achieve compliance with Subpart B of 40 CFR 192 at the Salt Lake City processing site the DOE proposed action is no remediation and application of supplemental standards based on "limited use ground water" (40 CFR 192.21(g)). Ground water in the uppermost aquifer is not a current or potential source of drinking water because widespread, ambient contamination not due to activities involving residual radioactive materials from the designated processing site exists that cannot be cleaned up using treatment methods reasonably employed in public water systems (40 CFR 192.11(e)(2)). The applicability of supplemental standards at the Salt Lake City site has been presented in the *Position Paper on the Applicability of Supplemental Standards to the Uppermost Aquifer at the Uranium Mill Tailings Remedial Action Vitro Processing Site, Salt Lake City, Utah* (DOE 1996b) (Attachment A), and the potential risk to human health and the environment has been addressed in the *Baseline Risk Assessment of Ground Water Contamination at the Uranium Mill Tailings Site Near Salt Lake City, Utah* (DOE 1995a) (Attachment B). Hydrogeologic information in this document is principally derived from the position paper mentioned above (DOE 1996b). This proposed action has been determined by applying the compliance strategy selection framework from the PEIS, consisting of five evaluative steps that are discussed below.

2.1 Assessment of Environmental Data

The first step in the decision process was an assessment of both historical and new environmental data collected to characterize hydrogeological conditions and the extent of ground water contamination related to uranium processing activities at the site. The site is approximately

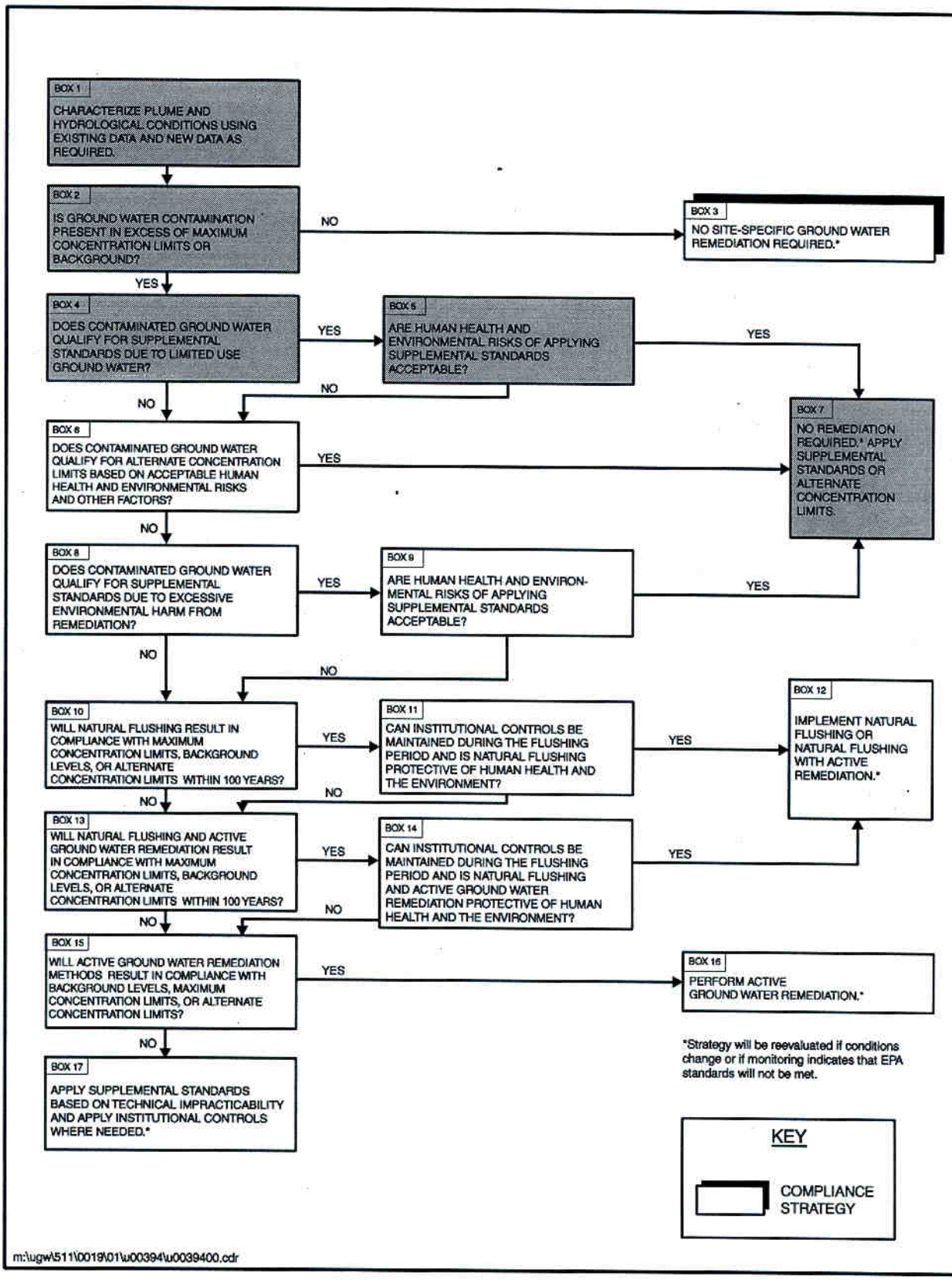

Figure 1. Compliance Selection Framework, Salt Lake City, Utah, Site

4 miles south-southwest of downtown Salt Lake City in an area dominated by commercial and industrial facilities. The area is characterized by very gentle topography in which anthropogenic changes are more apparent than the original topographic features (Figure 2). Surface remedial action at the Salt Lake City site (1984-1987) consisted of removal of uranium mill tailings and tailings-contaminated materials to a disposal cell at Clive, Utah. After surface remediation, the upper 4 to 13 feet (ft) of soil were replaced with clean sandy-gravel fill material. The lithology underlying this fill consists of approximately 700 ft of unconsolidated Quaternary lacustrine and fluvial deposits with minor alluvial overburden. The former processing site is owned by the Central Valley Water Reclamation Facility (CVWRF). The south part of the site has been developed into a golf driving range with a nine-hole golf course currently under construction. The northwest part of the site will be used for expansion of the CVWRF complex.

Ground water occurs in a shallow unconfined system (uppermost aquifer) and a deeper confined system. The shallow unconfined aquifer extends down to approximately 50 ft, with static water levels at 5 to 10 ft below ground level. The deeper confined aquifer begins approximately 70 ft below the ground surface and ground water is under artesian pressure. The two aquifers are separated by approximately 20 ft of interbedded layers of low-permeability clays and silts, and the vertical hydraulic gradient is upwards toward the shallow aquifer. Ground water in the shallow unconfined aquifer flows predominantly to the west-northwest and discharges to Mill Creek and the Jordan River. Mill Creek is a perennial stream that originates in the Wasatch Mountains to the east and flows westerly across the northern boundary of the CVWRF and the former processing site. Ground water is recharged from precipitation and seasonal irrigation (approximately 8 months) of the golf course in the south part of the site (using processed water from the CVWRF plant for the fairways and potable water for the greens).

The ground water flow system beneath the site is periodically affected by CVWRF pumping activities and by the storm drain lift station at the railroad underpass on 3300 South Street near the southeast corner of the site. These activities alter the normal ground water flow system and result in discharge of potentially contaminated ground water to surface water. Ground water is pumped from two dewatering wells by CVWRF for construction and maintenance purposes. One well is pumped continuously at approximately 150 gallons per minute and the other well is pumped as needed. The area is also dewatered periodically for construction projects. Extracted ground water is sent through the treatment plant and then discharged into Mill Creek. Ground water that enters the storm drain sump is pumped mostly through an underground pipe system which ultimately discharges to Mill Creek north of the site. There is a 150-ft section of this discharge pathway that is open to the surface just south of the CVWRF Administration Building.

DOE investigation has shown that ground water in the uppermost aquifer has been contaminated by processing of radioactive materials at the Salt Lake City site and the constituents of potential concern (COPC) with established maximum concentration limits (MCLs) are molybdenum and uranium. Concentrations of arsenic exceed its MCL in ground water in background and crossgradient monitor wells, but are not related to activities at the former processing site (see Section 2.3 below).

2.2 Ground Water Contaminants

The second step compares the COPCs in ground water with MCL or background levels (see Ground Water Quality Data by Parameter in Attachment G). Results of water quality sampling in the shallow unconfined aquifer in August 1998 indicate that concentrations of molybdenum were

below the MCL of 0.10 milligrams per liter (mg/L) and concentrations of uranium were just above the MCL of 0.044 mg/L in monitor wells 134 and 136 (the four existing monitor well locations are shown in Figure 2 and other decommissioned well locations are shown in figures in DOE 1996b). Results of water quality sampling in October 1999 indicate that concentrations of molybdenum were below the MCL in monitor well 134 and just above the MCL in monitor well 144. Concentrations of uranium were just above and below the MCL in monitor wells 134 and 144, respectively. Concentrations of molybdenum and uranium were near or below the detection limit in ground water in the deep confined aquifer (monitor wells 143 and 145). The vertical hydraulic gradient between the two aquifers is upward as indicated by flowing ground water from the two wells in the deep confined aquifer relative to the water table at approximately 10 ft below the surface in the two adjacent wells in the shallow unconfined aquifer (Attachment H). Therefore contamination of ground water in the confined aquifer due to site-related COPCs is highly unlikely.

Dewatering at the CVWRF, in conjunction with natural ground water gradients (controlled by Mill Creek and the Jordan River) and the distribution of channel deposits in the subsurface, has limited the extent of contamination to the site and areas just west of the site (in the area of former monitor wells 011 and 109). Recent field screening of ground water in areas downgradient of the site did not encounter clear evidence of site-related contamination. In all cases, ground water samples had uranium concentrations within the range of both background ground water and sources of surface recharge (Mill Creek and the Jordan River). Ground water samples from monitor wells in the deeper confined aquifer through 1994 indicate no elevated concentrations of site-related constituents (DOE 1996b). A former Vitro water supply well (SSL-8) in the deeper confined aquifer (discontinuously screened from 575 to 848 ft) in the southeast corner of the site was sampled in 1985 and 1989 and likewise showed no site-related contamination in ground water (DOE 1995a) (this well was recently decommissioned—see Section 3.0).

2.3 Applicability of Supplemental Standards

The third step determines whether contaminated ground water in the uppermost aquifer qualifies for supplemental standards based on limited use ground water. Ground water in the shallow unconfined aquifer is of limited use because of the widespread occurrence of arsenic that is not related to activities at the former processing site. Sources of arsenic in ground water include leaching from landfills, and from tailings and slag heaps associated with abandoned smelters in the valley that processed lead, copper, silver, and gold. Background arsenic concentrations in ground water range up to 0.173 mg/L (DOE 1996b).

Ground water from the shallow unconfined aquifer is not a current or potential source of drinking water, thus it is not reasonable to clean up the water using treatment methods employed in public water systems. Ground water from the shallow aquifer is not currently used and there is no historical record of wells completed in this unit downgradient of the site. Future use of ground water from the shallow aquifer is unlikely based on historical trends and the rapid expansion of commercial and industrial facilities in the area. Therefore, the current and reasonably projected uses of site-impacted ground water would be preserved with the application of supplemental standards.

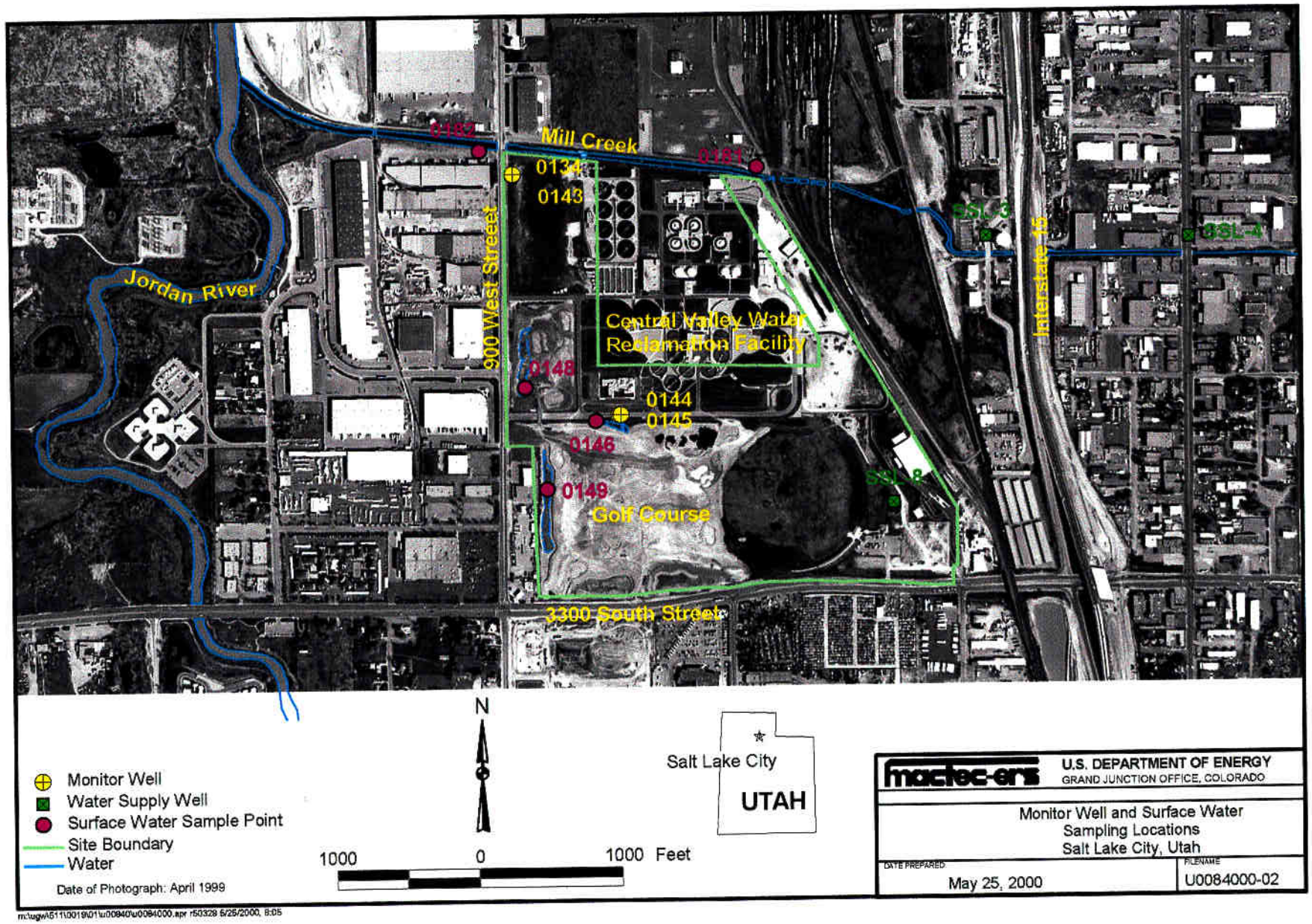

Figure 2. Monitor Well and Surface Water Sampling Locations, Salt Lake City, Utah, Site

Sources of potable water are readily available from municipal water supply systems, which obtain water from the deep confined aquifer in the vicinity of the site. The nearest water supply wells (SSL-3 and SSL-4) are more than one-half mile northeast of the site in a cross-gradient direction (CH2M HILL 1996) (Figure 2).

2.4 Human Health and Environmental Risks

The fourth step considers whether the human health and environmental risks of applying supplemental standards are acceptable. Assessment of site conditions and consideration of potential impacts on environmental resources indicate that supplemental standards will be protective of human health and the environment.

Because of the poor ambient quality of the shallow unconfined ground water in the area, it will not be used as a source of drinking water. The only reasonable exposure pathway to ground water for humans would be where it discharges to Mill Creek, where water from the storm drain lift station surfaces, or in ponds on the golf course that may intermittently contain ground water. Exposure to water in these instances would primarily be dermal and would be incidental in nature. This would pose no unacceptable human health risks because of the short exposure duration and because concentrations of uranium in ground water are low (close to the MCL of 0.044 mg/L). Additionally, as ground water is discharged to the surface at both the storm drain lift station and Mill Creek, significant dilution would occur through mixing with storm water and creek water, respectively. This would result in uranium concentrations decreasing to well below the MCL, as evidenced by surface water sampling adjacent to and downstream from the site.

Likewise, impacts on ecological receptors through exposure to site ground water are not expected. Dilution effects in Mill Creek and the storm water drain are protective of aquatic receptors. The low contaminant concentrations in ground water would have no negative impacts on plants that might root into the contaminated ground water. Furthermore, contaminants are being flushed from the aquifer because of the periodic dewatering at the CVWRF and are being further diluted from irrigation of the golf course.

The upward vertical hydraulic gradient between the limited use shallow unconfined aquifer and the deeper confined aquifer prevents migration of contaminants downward. In the unlikely event of gradient reversal, the relatively low concentrations of COPCs would be likely attenuated or diluted and would not impact ground water in the deeper aquifer.

Since the former processing site is owned by CVWRF access to the land and to potentially contaminated ground water in the shallow aquifer beneath the site is controlled, which will enhance protection of human health and the environment. In 1983 DOE and the State of Utah entered into a Cooperative Agreement (Number DE-FC04-81AL616309) for the remediation of the Salt Lake City processing site. Between 1985 and 1987 excavation and disposal of the uranium mill tailings and site restoration were performed. Under the agreement, several areas of elevated radioactive contamination were allowed to remain in place. The *Completion Report for the UMTRA Project Vitro Processing Site, Salt Lake City, Utah* (DOE 1997) provides a discussion of the contaminated areas including an estimate of mass, location, and a health assessment resulting from exposure to the contamination. Based on this contamination, a *Notice of Residual Radioactive Contamination* (Attachment I) was developed and signed by DOE, the State, and CVWRF. This notice functions as an institutional control in support of land-use

restrictions to prohibit any construction in contaminated areas. As a result of this enforcement, contaminated ground water access and use are also restricted within the site boundaries. Additionally, the CVWRF representative indicated that the facility has no intention of selling this property. CVWRF is currently in the process of completing a golf course, which consumes the majority of the former processing site, making the land and the ground water inaccessible for other uses.

2.5 Compliance Strategy Selection

The fifth and final step in the framework is the selection of an appropriate compliance strategy to meet the EPA ground water protection standards. The selected strategy is no remediation and application of supplemental standards based on limited use ground water (40 CFR 192.21(g)). Ground water in the uppermost aquifer is not a current or potential source of drinking water because widespread, ambient contamination not due to activities involving residual radioactive materials from a designated processing site exists, that cannot be cleaned up using treatment methods reasonably employed in public water systems (40 CFR 192.11(e)(2)).

3.0 Implementation

Ground water and surface water monitoring will be continued at the Salt Lake City site as a best management practice (Table 1 and Figure 2). This monitoring will continue for a minimum period of 5 years (through 2004). At the end of this period an evaluation will be made in consultation with NRC and the State of Utah to determine the need for future monitoring at the site. Criteria for terminating monitoring will be no significant reversal of the hydraulic gradient, a decrease in COPC concentrations in ground water as anticipated, and no unacceptable risks related to pumping of ground water by CVWRF or the storm drain sump. DOE will receive NRC approval prior to termination of monitoring.

Table 1. Ground Water and Surface Water Monitoring, Salt Lake City, Utah, Site

Well/Stn	Location	Interval[a]	Analytes	Water Level[b]	Frequency
134	Downgradient	Shallow	U and Mo	Datalogger	Annual
143	Downgradient	Deep	[c]	Manual	[d]
144	Onsite	Shallow	U and Mo	Datalogger	Annual
145	Onsite	Deep	[c]	Manual	[d]
146	Open ditch onsite	Surface	U and Mo	N/A	Annual
148	Pond west of CVWRF	Surface	U and Mo	N/A	Annual
149	Pond southwest of CVWRF	Surface	U and Mo	N/A	Annual
181	Mill Creek - upstream	Surface	U and Mo	N/A	Annual
182	Mill Creek - downstream	Surface	U and Mo	N/A	Annual

[a] Shallow unconfined aquifer and deep confined aquifer.
[b] Dataloggers in shallow wells will be downloaded quarterly—deeper wells will be observed visually (and water level measured as applicable) at the same time. Dataloggers record water level every 4 hours.
[c] Samples will be analyzed for same constituents if vertical hydraulic gradient reverses.
[d] Wells in deep aquifer will be sampled only if vertical hydraulic gradient reverses.

The primary State concern was possible migration of potentially contaminated ground water in the shallow unconfined aquifer downward into the deeper confined aquifer if the upward vertical hydraulic gradient were to reverse. This will be monitored by measuring ground water levels in pairs of wells completed in the shallow (monitor wells 134 and 144) and deep (monitor wells 143

and 145) aquifers respectively, at two locations onsite and downgradient (Figure 2). DOE will also monitor ground water quality annually in the two wells in the shallow unconfined aquifer (monitor well 134 downgradient and 144 onsite) to ensure that concentrations of COPCs (molybdenum and uranium) continue to decrease. If there is an indication that the vertical hydraulic gradient is reversed, ground water in the deep confined aquifer will be sampled and analyzed to ascertain that no site-related constituents migrate into the deeper aquifer. Baseline monitoring in October 1999 shows that there is a strong upward vertical hydraulic gradient and that concentrations of uranium and molybdenum in ground water in the deeper confined aquifer are near or below the detection limit (Attachments G and H).

The NRC was concerned with the potential exposure pathway of contaminated ground water pumped from the shallow unconfined aquifer during CVWRF activities or from the storm drain sump southeast of the site. Ground water that is periodically extracted by CVWRF for construction and maintenance purposes is run through the treatment plant and then discharged into Mill Creek. Although treatment does not include metals removal, the low initial concentrations of COPCs in ground water and the subsequent dilution during the process preclude any unacceptable risk at the discharge point in Mill Creek. Sampling of surface water in 1994-1995 from Mill Creek upstream and downstream of the discharge point from the plant, as well as water from the plant, showed maximum concentrations of uranium of 0.005 mg/L (DOE 1996b). Ground water that enters the storm drain sump (inaccessible at the railroad underpass) is pumped mostly through an underground pipe system, which ultimately discharges to Mill Creek north of the site. There is a 150-ft section of this discharge pathway that is open to the surface just south of the CVWRF Administration Building. To ensure that these potential exposure pathways of contaminated ground water do not pose a risk to human health and the environment, DOE will monitor surface water annually at the west end of the open ditch onsite (location 146), and Mill Creek upstream (location 181) and downstream (location 182) of the site (Figure 2) (Table 1). There are also several ponds on the golf course, which intermittently contain ground water that will be sampled at the same time (locations 148 and 149). These samples will be analyzed for COPCs.

As an added precaution against potential contamination of ground water in the deeper aquifer the Vitro water supply well (SSL-8) in the southeast corner of the site was decommissioned in September 1999 (Figure 2 and Attachment H). The well had been in place for a number of years and the integrity of the annular seal was unknown. The well belonged to the City of South Salt Lake who was not using the well and had no plans to do so. The City of South Salt Lake granted DOE authorization to decommission the well.

Monitor wells at the site no longer determined to be part of the monitoring network were decommissioned in September 1999. The remaining four monitor wells will be decommissioned upon termination of monitoring as discussed above.

The Long-Term Management Plan (LTMP) (DOE 2000) will also contain the information on ground water and surface water monitoring as well as specifying all other long-term surveillance activities and reporting requirements necessary for the site. The LTMP will be a stand-alone document to guide long-term surveillance activities at the Salt Lake City processing site. Other activities will include inspection and maintenance of monitor wells at the site and continuation of the access agreement for sampling and maintenance of the wells.

4.0 Environmental Considerations

To comply with NEPA requirements DOE prepared the PEIS, which was issued in October 1996 (DOE 1996c). The PEIS assesses the potential programmatic effects of conducting the ground water project, provides a method for determining the site-specific ground water compliance strategies, and provides data and information that can be used to prepare site-specific environmental impact analyses more efficiently. In the proposed action (preferred alternative), ground water compliance strategies are tailored to each site to achieve conditions that protect human health and the environment. The selection framework for determining an appropriate compliance strategy at each site is presented in Section 2.1 of the PEIS and is discussed in Section 2.0 of this GCAP. Relevant areas of environmental concern are discussed below.

Environmental issues and resources potentially affected by the proposed action may include the following:

- Risk to human health and the environment
- Ground water use
- Surface water use
- Land use
- Exposure to potentially contaminated ground water
- Environmental site restoration

Environmental impacts from the proposed action on these issues and resources have been assessed in several of the referenced documents (DOE 1984, 1993a, 1993b, 1995a, 1995b, 1996a, and 1996b). Results are summarized below.

- There is no unacceptable risk to human health and the environment. Access to the land and potentially affected ground water is controlled by the current land owner and the planned use of the property. There is no apparent risk to ecological receptors from contaminants in ground water, surface water, or sediments. There is also an institutional control in support of land-use and ground water access restrictions within the site boundaries.

- Ground water from the shallow unconfined aquifer is not a drinking water resource in the area, and access to potentially contaminated ground water is restricted. Surface water at the site is likewise not used as a water resource.

- The former processing site is owned by CVWRF. They control access to the site and this limits any exposure to potentially contaminated ground water beneath the site.

- The Salt Lake City site underwent surface remedial action from 1984-1987. The upper 4 to 13 ft of soil were replaced with clean fill material. Uranium mill tailings and tailings-contaminated materials were hauled to a disposal cell at Clive, Utah. Therefore, no source materials remain at the site.

To accommodate the NEPA obligation to make relevant environmental information available to public officials and citizens before decisions are made and before actions are implemented, DOE has distributed relevant environmental documents (including this document and attachments) to

the Division of Radiation Control of the Utah Department of Environmental Quality, the City of South Salt Lake, and the Central Valley Water Reclamation Facility (owner of the site).

5.0 References

CH2M HILL, 1996. *City of South Salt Lake Well Delineation Report*, prepared by CH2M HILL, Salt Lake City, Utah, August 1996.

U.S. Department of Energy (DOE), 1984. *Final Environmental Impact Statement -- Remedial Actions at the Former Vitro Chemical Company Site, South Salt Lake, Salt Lake County, Utah*, DOE/EIS-0099-F.

———, 1993a. *Salt Lake City Vitro Site - Groundwater Mound Resultant From Golf Course Irrigation*, memorandum to Sharon Arp, 04 August 1993, JEGA/UMT/0893-0441.

———, 1993b. *Hydrogeologic Characterization of the Former Vitro Processing Site, Salt Lake City, Utah*, DOE/AL-050130.0000.

———, 1995a. *Baseline Risk Assessment of Ground Water Contamination at the Uranium Mill Tailings Site Near Salt Lake City, Utah*, DOE/AL/62350-134, Rev. 1.

———, 1995b. *Report of Ground Water Monitoring for Expansion of the Golf Course, Salt Lake City, Utah, Vitro Processing Site*, DOE/AL/62350-191, Rev. 0.

———, 1996a. *Report of Ground Water Monitoring for Expansion of the Golf Course, Salt Lake City, Utah, Vitro Processing Site*, DOE/AL/62350-229, Rev.0.

———, 1996b. *Position Paper on the Applicability of Supplemental Standards to the Uppermost Aquifer at the Uranium Mill Tailings Remedial Action Vitro Processing Site, Salt Lake City, Utah*, DOE/AL/62350-227, Rev. 0.

———, 1996c. *Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action Ground Water Project*, DOE/EIS-0198.

———, 1997. *Completion Report for the UMTRA Project Vitro Processing Site, Salt Lake City, Utah.*

———, 2000. *Long-Term Management Plan for the Salt Lake City, Utah UMTRA Processing Site*, Document Number S0041600.

End of current text